

**METHOD FOR SHIFTING THE BANDGAP  
ENERGY OF A QUANTUM WELL LAYER**

**ABSTRACT OF THE DISCLOSURE**

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A process for shifting the bandgap energy of a quantum well layer (e.g., a III-V semiconductor quantum well layer) without inducing complex crystal defects or generating significant free carriers. The process includes introducing ions (e.g., deep-level ion species) into a quantum well structure at an elevated temperature, for example, in the range of from about 200 °C to about 700 °C. The quantum well structure that has had ions introduced therein includes an upper barrier layer, a lower barrier layer and a quantum well layer. The quantum well layer is disposed between the upper barrier layer and the lower barrier layer. The quantum well structure is then thermally annealed, thereby inducing quantum well intermixing (QWI) in the quantum well structure and shifting the bandgap energy of the quantum well layer. Also, a photonic device assembly that includes a plurality of operably coupled photonic devices monolithically integrated on a single substrate using the process described above.

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